

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A process Method for controlling the lean operation of an internal combustion engine, ~~especially an internal combustion engine of a motor vehicle,~~ provided with a nitrogen oxide storage catalyst, the process comprising:

performing a first operating phase (lean operation), comprising storing, as a storage phase, in which the nitrogen oxides produced by the internal combustion engine in a first operating phase (lean operation) as the storage phase are stored for a specific storage time in the nitrogen oxide storage catalyst, and

switching to a second operating phase (rich operation) in which, after the storage time expires, by a control device as the engine control at a specific switching instant for a specific discharge time ~~switching to a second operating phase (rich operation) takes place as the~~ discharge phase in which the nitrogen oxides which have been stored during the storage time are discharged from the nitrogen oxide storage catalyst,

flowing the nitrogen oxide mass flow upstream of the nitrogen oxide storage catalyst and/or the nitrogen oxide mass flow downstream of the nitrogen oxide storage catalyst each being integrated over the same time interval,

characterized in that

determining a switching operating point in a first process step, to establish the instant of switching from the storage phase to the discharge phase, a switching operating point is determined at least from the integral value of the nitrogen oxide mass flow upstream and/or downstream of the storage catalyst, and

comparing that the respective switching operating point is compared in a second process step to a definable operating field which is optimized especially with respect to a the fuel savings potential as a function of a the load acceptance of the internal combustion engine, which is formed by a plurality of individual operating points for one new and one aged storage catalyst; such that

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whereby when for a switching operating point ~~which~~ is located within ~~the~~ an operating field, the engine control enables lean operation and thus switching between the storage phase and the discharge phase of the nitrogen oxide storage catalyst, while the engine control conversely dictates lambda operation of the internal combustion engine at which lambda is equal to 1 for a switching operating point which departs from ~~the~~ a definable operating field.

2. (Currently Amended) The process as claimed in claim 1, ~~wherein further comprising spanning~~ the operating field ~~is spanned~~ depending on the load ~~essentially~~ by a savings potential boundary curve for a new nitrogen oxide storage catalyst and by a savings potential boundary curve for an aged storage catalyst which represents a boundary ageing state.

3. (Currently Amended) The process as claimed in claim 1 ~~or 2~~, ~~wherein further comprising:~~

determining a relative nitrogen oxide slip as the difference between the nitrogen oxide mass flow which has flowed into the nitrogen oxide storage catalyst and the nitrogen oxide mass flow which has flowed out of the nitrogen oxide storage catalyst to establish the switching instant from the storage phase to the discharge phase, ~~a relative nitrogen oxide slip as the difference between the nitrogen oxide mass flow which has flowed into the nitrogen oxide storage catalyst and the nitrogen oxide mass flow which has flowed out of the nitrogen oxide storage catalyst is determined~~ relative to the storage time ~~such, and~~

bringing that the quotient of the integral values of the nitrogen oxide mass flow upstream and downstream of the nitrogen oxide storage catalyst ~~moreover is brought~~ into a relative relationship with a definable degree of nitrogen oxide conversion which has been derived from the exhaust boundary value, so that when these given switching conditions are present in the case of a switching operating point which is within the operating field, switching from the storage phase (lean operation) to the discharge phase (rich operation) is carried out at the switching instant which has been optimized with respect to fuel consumption and the storage potential.

4. (Currently Amended) The process as claimed in claim 3, wherein:

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the relative slip is the quotient of the integral over the nitrogen oxide mass flow downstream of the nitrogen oxide catalyst and of the integral over the nitrogen oxide mass flow upstream of the nitrogen oxide catalyst and

wherein this quotient for determining the switching condition is set equal to the definable switching threshold value K which originates from the definable degree of nitrogen oxide conversion so that when this switching condition is met, switching to the discharge phase takes place from the storage phase at the end of the storage time which was thus determined.

5. (Original) The process as claimed in claim 4, wherein
the switching threshold value K satisfies the following equation:

$$K = 1 - \text{defined rate of nitrogen oxide conversion}$$

with a given rate of nitrogen oxide conversion of less than 1, preferably with a given rate of nitrogen oxide conversion of at least 0.80, at most preferably of 0.95.

6. (Currently Amended) The process as claimed in ~~one of claims~~ claim 1 to 5,
wherein

the switching operating point is determined as a function of the instantaneous operating temperature at the switching instant to determine the degree of ageing of the storage catalyst from the integral value of the nitrogen oxide mass flow upstream and/or downstream of the storage catalyst and/or the switching instant when the switching condition is met, ~~moreover the switching operating point is determined as a function of the instantaneous operating temperature at the switching instant, and~~

further comprising comparing wherein the respective switching operating point is compared in a second stage for determining the degree of ageing of the storage catalyst to a definable storage catalyst capacity field which is optimized ~~especially~~ with respect to fuel consumption, which runs over a temperature window, and which is formed by a plurality of individual operating points for a new and an aged storage catalyst,

such that the switching operating point which lies within the storage catalyst capacity field does not constitute a failure to reach the minimum nitrogen oxide storage capacity, but

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represents the change relative to the prior operating point as a measure of storage catalyst ageing, and

wherein a switching operating point which departs from the storage catalyst capacity field indicates a failure to reach the minimum nitrogen oxide storage capacity.

7. (Currently Amended) The process as claimed in claim 6, wherein the storage catalyst capacity field relative to the temperature window ~~on the one hand~~ is limited by the boundary line for a new storage catalyst and ~~on the other hand~~ by the boundary line for an aged storage catalyst which constitutes a boundary ageing state.

8. (Currently Amended) The process as claimed in claim 6 ~~or 7~~, wherein the temperature window comprises temperature values between approximately 200°C and approximately 450°C.

9. (Currently Amended) The process as claimed in claim one of claims 6 to 8, ~~wherein~~ further comprising setting an error signal in the engine control device ~~is set~~ in the event of a failure to reach the minimum nitrogen oxide storage capacity.

10. (Currently Amended) The process as claimed in ~~one of claims~~ claim 1 to 9, wherein the nitrogen oxide mass flow is modeled upstream of the nitrogen oxide storage catalyst.

11. (Currently Amended) The process as claimed in ~~one of claims~~ claim 1 to 10, ~~wherein~~ further comprising measuring the nitrogen oxide mass flow ~~is measured~~ downstream of the nitrogen oxide storage catalyst by means of a nitrogen oxide sensor.